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A Cost Effectiveness Analysis of an Orthopedic/Podiatry Minor Procedure Room

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## Abstract

National health care reform has fostered a focus on the issues of cost and access. While there continues to be a lot of talk on the issue of access, the foremost attention has been placed on the financing of health care delivery. Efforts to reduce the cost of health care have had a profound impact on surgical practice and specifically on the utilization of services and changing practice patterns.

One practice in which alternative methods should be explored is the performance of minor procedures. At Landstuhl Regional Medical Center (LRMC), minor surgical procedures requiring local anesthetics are being done in the main operating room (OR) due to inadequate minor procedure space in an alternative area. This practice leads to higher costs per case. Along with this high cost is the issue that there are frequent scheduling conflicts within the OR. Surgical delays lead to an increased amount of time that the patient is either away from their unit or unable to completely carry out their duties. Additionally, the current minor procedure room in the orthopedic clinic requires improvements and renovations to become fully operational.

This cost effective analysis showed that by renovating the minor procedure room in the Orthopedic Clinic, positive benefits will be noted to patient time, physician time and a decrease in the current backlog of surgical procedures. This improvement in the process, for those patients that require minor procedures, will be a more efficient use of the available resources to include patient, OR and physician time. The greatest cost to a medical facility is in the delivery of surgical care in the operating room and of that personnel costs are the largest proportion. For effective decision-making, it is important for hospital department managers to combine clinical and financial data to determine the operating costs of their department.

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## A Cost Effectiveness Analysis of an Orthopedic/Podiatry Minor Procedure Room

### Introduction

#### Conditions which prompted the study

National health care reform has fostered a focus on the issues of cost and access. While there continues to be a lot of talk on the issue of access, the foremost attention has been placed on the financing of health care delivery. Efforts to reduce the cost of health care have had a profound impact on surgical practice and specifically on the utilization of services and changing practice patterns. These changes in focus have had some very positive effects. As the emphasis on efficiency grows, practitioners are forced to review practice patterns based on scientific thinking and not tradition (Stone & Doyle, 1996).

Given the current limitations on health care resources, it is inherent that health care professionals be committed to the challenge of improving the efficiency of the services they provide. At Landstuhl Regional Medical Center (LRMC) the current volume of orthopedic and podiatry surgical patients exceeds the capacity of the main Operating Room (OR). This has led to a high surgical backlog and to the inability of the Orthopedic and Podiatry clinic to meet the TRICARE access standards for active duty personnel and the access goals for other beneficiaries.

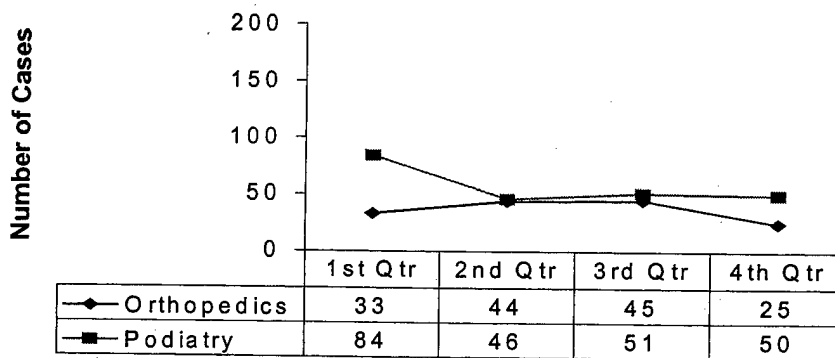


Figure 1. Fiscal year (FY) 99 surgical backlog.

Figure 1 depicts the surgical backlog or the number of patients that were waiting for a scheduled day of surgery in FY 99. This backlog also carries over into other services such as ENT and the time a patient waits for a surgical date. Waiting times may extend beyond 30 days. Figures 2 and 3 represent the percentage of patients and how long they are waiting for a surgical date from the 3<sup>rd</sup> and 4<sup>th</sup> quarters of Fiscal Year (FY) 99. The percentage of patients that waited less than 31 days from the day that the physician indicated the patient's need for surgery was 50% and 48% respectively.

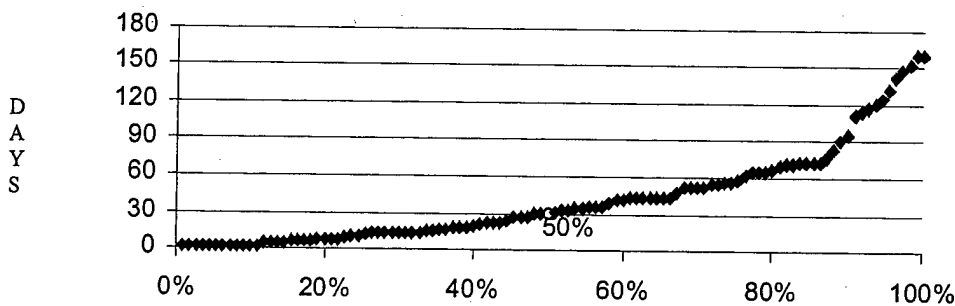


Figure 2. Patient Wait Time for Surgery/Percentage of Surgeries Completed (In Days) for 3<sup>rd</sup> Quarter FY 99 (n = 110).

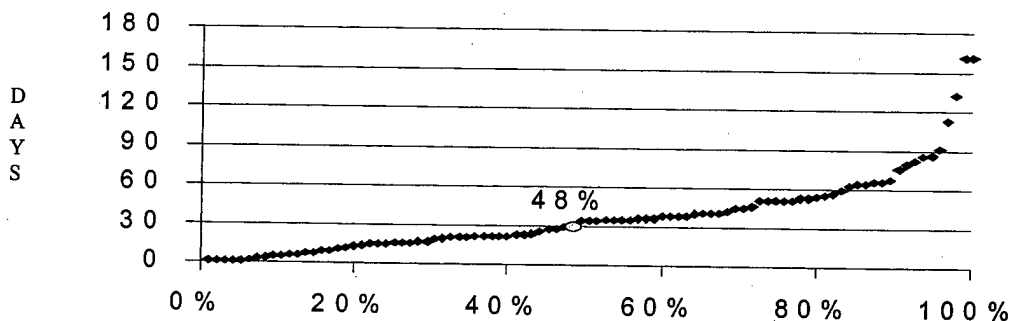


Figure 3. Patient Wait Time for Surgery/Percentage of Surgeries Completed (In Days) for 4<sup>th</sup> Quarter FY 99 (n = 95).

During FY99, 125 consults for beneficiaries to the preferred provider network (PPN) were documented for orthopedic and podiatry services. These consults to external providers were due to the demand for access by the beneficiary population exceeding the clinic capacity. This number includes only the initial consult and is not indicative of the need for follow up or surgical procedures.

Concerns among the orthopedic and podiatry clinic staff led to the development of a performance improvement team (PIT) to research the issues surrounding minor procedures performed by orthopedics and podiatry services. Their concerns included decreased customer satisfaction, decreased productivity as measured by the surgical backlog and delays in appointment scheduling, increased patient complaints regarding the surgical backlog, and limited patient access (available for active duty only) under the current system.

#### Statement of the problem

During FY99 there has been a decrease in available staff, to include support staff, due to the increased military operational tempo and required taskings. The TRICARE standard is 30 days for an active duty (AD) consult. Currently, the time a patient must wait for a procedure in the specialty areas of orthopedics and podiatry may exceed that standard and the required operating room (OR) time is not available to manage the patient volume. Minor surgical procedures requiring local anesthetics are being done in the main OR due to inadequate minor procedure space in an alternative area. This leads to higher costs per case. Along with this high cost is the issue that there are frequent scheduling conflicts within the OR. Surgical delays lead to an increased amount of time that the patient is either away from their unit or unable to completely carry out their duties. Additionally, the current minor procedure room in the orthopedic clinic requires improvements and renovations to become fully operational.

## Literature Review

### History of ambulatory surgery

The literature indicates that increasing numbers of operations are being performed as ambulatory procedures outside of the hospital setting with no overnight stay required. The number of all surgical procedures performed in an outpatient setting has nearly doubled from 8 million in 1985 to 15.7 million in 1992. Nearly 3 million of those in 1992 were performed outside of the hospital setting (Stone & Doyle, 1996). Estimates in 1997 indicated that 60% of all surgical procedures in the United States were being performed in ambulatory surgical settings. By the year 2000 this figure is expected to rise to nearly 75% (Orr & Pavlin, 1996). These procedures 10 years earlier would have been performed strictly on an inpatient basis. technological advances that make it safer to perform procedures in an ambulatory setting, fueled by competition, diminishing resources and technological advances, has compelled health care systems to build infrastructures that support ambulatory care and reduce the need for expensive hospitalizations (Nafziger, Lundstrom, Chandra, & Massanari, 1997).

As we rapidly move into the era of managed care, the emphasis continues to shift to encouraging providers to utilize the least expensive care that is appropriate, or as a less cynical approach, to at least provide the best patient care at the fairest price. The concept of value-based care has encouraged providers to critically evaluate what they do, how they do it, and whether they can do it less expensively without compromising the quality of care. These concepts and the rapidly changing environment of health care has given health care providers the opportunity and the duty to study and compare the services they provide in the pursuit of quality (Orr & Pavlin, 1996). Continuous quality improvement (CQI) which forces institutions to study the quality of the care provided compared to the price of that care has become a mainstay for the

Army Medical Department as it continues to embrace business practices.

At LRMC, in an effort to identify available alternatives to performing the minor procedures that are currently being performed in the OR, a Performance Improvement Team was formed. The members of the team include an Orthopedic Service/Team Leader, Podiatry Staff Surgeon, Nurse Manager/Case Manager and Administrator. The Non-Commissioned Officer in Charge (NCOIC) of orthopedic services and the nurse in charge of infection control provided consultations. The vision for this committee is: To renovate the minor surgery room in the Orthopedic clinic to provide improved outpatient care, timely clinic access, and indirectly heighten unit readiness by decreasing the waiting times for surgical procedures and clinic evaluations. The goals are to (a) decrease and/or eliminate waiting times for orthopedic and podiatry minor surgery and clinic visits, (b) increase customer satisfaction, (c) provide orthopedic and podiatry services to family members and DOD beneficiaries. The committee determined that these goals could be accomplished by renovating the current minor procedure room in the clinic.

Examples of the procedures that are predicted by orthopedics to be performed in the minor procedure room are the following: carpal tunnel release, trigger digit release, nail bed repairs, percutaneous pinning finger fractures, excisional biopsies for hands and feet, and hardware removal. The list of procedures from podiatry includes: hammer toe repairs, arthroplasty digits, arthrodesis lesser digits, excision of ganglion cysts, neurectomy, simple osteotomies for the foot, reduction of digital metatarsal fractures, excision of foreign bodies, incision and drainage, partial plantar fascia release, removal of screws and pins, sharp matriectomy, and skin biopsies. The anesthesia for each of these procedures and others performed in the minor procedure room would only require local anesthesia. Procedures that

will require intravascular sedation or medication as well as those that require general anesthesia would be performed in the OR.

The current process for a patient needing a minor procedure includes the following steps:

1. Determine the need for minor surgery
2. Separate pre-op appointment
3. History and physical by physician
4. Ambulatory Procedure Unit (APU) appointment
  - Nurse interview
  - Anesthesia interview
5. Procedure occurs on scheduled date in main OR
6. Post Anesthesia Care Unit visit
7. Return to APU
8. Discharge patient

#### Ambulatory Procedure Visits

An ambulatory procedure visit (APV), defined by the Department of Defense, refers to a “medical or surgical intervention that is invasive and typically high risk or problem prone and requires immediate (day of procedure), pre-procedure, and immediate post-procedure care in an APU (DODI 6025.8 draft, 1999).” The length of care provided to patients in this category is 23 hours or less. An APU is a designated clinical area that is equipped, staffed and designated for the purpose of providing an intensive level of outpatient care that is associated with the APV. There may be more than one location within a military treatment facility (MTF) designated as an APU. These areas are designated individually by the MTF. Additionally APVs can only be provided within an APU.

The Army Medical Department (AMEDD) encourages the efficient use of health care resources while at the same time providing high quality health care. The use of APVs is suggested to be a cost-effective opportunity to provide quality patient care.

Data related to the APV is collected for the purposes of workload reporting, expense allocation, biostatistical applications, and other administrative purposes. More specifically this data is captured in the Composite Health Care System (CHCS), the Ambulatory Data System (ADS), and the Medical Expense Reporting System (MEPRS). The CHCS Patient Appointment System module counts the APV as a visit to the work setting that has been established as the APU. CHCS then sends the information to ADS where the encounter is recorded. The providers then code the appropriate International Classification of Diseases—Clinical Modification (ICD-9-CM) diagnoses and the Current Procedural Terminology (CPT) medical procedures in addition to the evaluation and management services relevant to the APV. In ADS the encounter is also indicated in the appointment status as “ambulatory surgery”. Finally for accounting purposes the data is captured in the MEPRS system. APVs are identified using a four-digit alphanumeric code. The first of the three digits reflects the outpatient work center specialty code. The fourth digit is added to distinguish the category of work. Specifically for APVs the number is 5, for example BBA5 designates general surgery APVs. MEPRS under these codes records only physician time, procedures, and diagnostic studies in support of the APV. At the end of the month, each APU reports to MEPRS a numerical patient tally and associated minutes of service by medical specialty (Department of the Army, Headquarters, U.S. Army Medical Command, 1999).

It is essential for managers to understand the costs of their business. This knowledge helps the manager to determine how efficient their organization utilizes its assets. These assets

include manpower, equipment, and money. The mechanism used to capture the data necessary to determine the cost of operations in the Military Health System is MEPRS. MEPRS integrates financial data (expenses), with non-financial data such as workload and man-hour/full-time equivalents (FTEs) to produce a cost, total cost and a cost per unit of workload or FTE value. The information is then used to allocate or "step down" the expenses of non revenue producing work centers into revenue producing work centers so that each receives a share of the total cost and unit cost. This method adds stepped down expenses to the direct expenses to produce a true cost for the work center (Medical Expense and Performance Reporting System Division, 1998).

#### Infection Control Standards

The change of surgical procedures from the inpatient/OR setting to outpatient/ambulatory procedure setting should theoretically reduce the risk for nosocomial infections. This assumption comes from the substantial differences that the ambulatory setting has from the inpatient setting. This leads to the development and implementation of policies and procedures to control the risk for nosocomial infections in ambulatory care that are tailored to that risk and the context in which the transmission occurs. Because research has not caught up with the rapid transition to the ambulatory environment, the "quick fix" has been to apply the same infection control policies and procedures that were developed for the hospital environment. This method may impose unnecessary costs and inefficiencies on the healthcare system (Nafziger, et al, 1997).

It is suggested that surgical wound infection rates are lower for procedures conducted in the outpatient settings compared to those in the hospitals. This is suggested for several reasons: (a) most outpatient surgeries involve patients with Class1 (clean) and Class 2 (clean contaminated) wounds, (b) exposure to multi-drug resistant hospital pathogens is reduced in the



ambulatory setting, and (c) the patients that do undergo surgery with Class 3 (contaminated) or 4 (dirty-infected) wounds are generally at lower risk than those in the hospital (Nafziger, et al, 1997). Although these findings are promising, this is an area where further research needs to continue.

### Purpose

The purpose of this paper is to determine the cost effectiveness of a minor procedure room within the orthopedic clinic. This analysis will demonstrate a comparison of the status quo and the development of the clinic based procedure. Once completed, this analysis will then give decision-makers at LRMC the outcome measures that can be used to make an informed decision.

### Method and Procedures

Examining the economic consequences of medical practice in the long run protects the welfare of the patients. The cost of medical interventions must be balanced against the patient outcomes produced and the amount of money that the health care organization is willing to spend (Sperry, 1997).

The economic approach to resource allocation is based on two key concepts, first, the scarcity and limited useful life of resources. Secondly, realizing that resources are scarce forces decision-makers to make choices about how the available resources should be used. When we choose to allocate resources to one program or technology others do not get the needed resources. An economic analysis attempts to ensure that the benefits of a particular choice exceed the costs, as well as the benefits of other alternatives. The latter considers the concept of opportunity costs. An opportunity cost is the value the resource could have produced if it were directed toward its next best available alternative (Heyland, Gafni, Kernerman, Keenan, & Chalfin, 1999).

In health care most frequently the goal is to maximize health benefits. This often leads to ensuring that the value of what we choose to do with the available resources must be at least as great as the opportunity cost. These considerations are used to ensure that the best possible outcomes are achieved for a given level of expenditure. This concept is that of economic efficiency (Heyland, et al, 1999).

Economic evaluations systematically consider all possible costs and benefits/consequences of a potential decision. Even though an economic analysis is not the sole basis for a decision, it is a useful tool that can be used by health care providers and administrators when making decisions on the use of scarce resources. An economic evaluation offers information that can be used to maximize the health benefits of the community given the available level of resources (Heyland, et al, 1999).

Cost effectiveness analyses are often used to examine treatments that cost money rather than save money. In this situation, the costs of all alternatives are unavoidable or acceptable. Therefore, the emphasis then shifts to cost minimization. In a cost effectiveness analysis two or more treatments or interventions are compared. In this study I will compare the cost of orthopedic and podiatry minor procedures being performed as status quo in the centralized OR compared to them being performed in a local treatment room within the clinic (Sperry, 1997). Cost effectiveness analyses assume that the outcome of interest is worthwhile and clinically relevant. These analyses give decision-makers outcome measures that can be used to make informed decisions.

### Costs

All costs directly incurred, as a result of providing health care, should be included in a cost effectiveness analysis. When measuring costs there are four primary types of costs. These

are medical care and administration, follow-up and treatment damages, patient time and pain, and family and provider time and inconvenience (Getzen, T. E., 1997).

When considering the medical care or direct costs it is important to understand the difference between charges and costs. Charges reflect something different from the actual resources consumed. Charges and the cost-to-charge ratios are specific to a particular institution and may even vary within an institution depending on the payer and the insurance coverage. From the patient and third party payer viewpoint, charges may more accurately reflect the effect on their budget however for the use in an analysis we need to use the real costs (Heyland, et al, 1999). Often the actual costs of hospital services are only about 60 percent of the billed charges on average (Getzen, T.E., 1997).

APV billing will follow the Third Party Collection Program (TPCP), Interagency, and International Military Education and Training (IMET) billing. The APV rates applicable to these categories, as prescribed in the annual DOD Medical and Dental Services Reimbursement Rates document, is used. The APVs are not admissions to the MTF and therefore the inpatient per diem rate, which includes subsistence for active duty, retirees, or family members, is not charged.

Table 1

Charges for the Ancillary Care Provide by Orthopedics and Podiatry at LRMC

MEPRS Code	Clinical Service	International Military Education & Training	Interagency & other Federal Agency Sponsored Patients	Other (Full Pay/Third Party)
BEA	Orthopedic Visit	\$93.00	\$174.00	\$183.00
BEC	Hand Surgery	\$69.00	\$129.00	\$136.00
BEF	Podiatry Visit	\$56.00	\$105.00	\$111.00
BE*5	Orthopedic Care APV(This includes Podiatry APVs)	\$1179.00	\$2192.00	\$2313.00

These medical care costs include the “up front costs” or the initial costs associated with the implementation of the intervention as well as the future costs of resources that will be consumed in order to maintain the service. Cost accounting in a cost effectiveness analysis looks at resources (nursing hours, technician time, space, supplies, etc.) that are estimated from direct observation and costed using prevailing wages, prices, etc. and includes an overhead charge that is applied for administration, utilities and other central services (Getzen, T.E., 1997).

The construction and equipment costs are large fixed costs for a facility. Though they are amortized over a long period of time, they form a large amount of money that must be paid each month and raised as start-up capital. If these costs can be controlled properly and appropriately on the front end, it helps insure the success of the project and the financial returns (Zasa, 1998).

One of the greatest costs for surgical services within a hospital occurs in the OR. Salaries for the OR staff, to include nursing and anesthesia, account for most of those costs. These labor costs are fixed and do not vary on a day-to-day basis according to the number of cases or the case mix for that day. Therefore it is essential for the OR manager to minimize “underutilized time” (Dexter, Macario, Lubarsky, & Burns, 1999).

The next type of cost is the follow-up and treatment damages. These are secondary treatment costs. They are costs that may result if the treatment or test is not done. In medical analyses it is important to consider the cost of the risks of potential serious complications. Any comprehensive analysis involves many secondary or unintended effects that must be included (Getzen, T. E., 1997).

The US Public Health Service Panel on Cost Effectiveness in Health and Medicine recommended that all published cost effectiveness analyses include a societal perspective. This

consideration is the most general and therefore the most difficult, not providing the best answers to specific questions. The cost to society is the net cost to all the different components of society. This includes the patients' lost productivity and the pain they suffer. These costs often outweigh the direct medical costs. Because this cost is the most general and largely intangible, it is difficult to enumerate and appropriately quantify all of the costs to society (Sperry, 1997). It is common when trying to quantify this cost to value patient time at the average wage rate for employed workers. However pain suffering, anxiety, and death are most appropriately valued according to that person's willingness to pay. For this reason the analyst can not assume the patient's point of view (Getzen, T. E., 1997).

The final cost is the time that a provider is inconvenienced. The provider "hassle cost" of paper work and administration requirements in managed care and the resulting decreased utilization to avoid this inconvenience are responsible for as much as half of the reduction in medical costs obtained by managed care firms (Getzen, T. E., 1997). In addition, it is important to note that if the provider's time can be more efficiently used there is more time for patient care and visits.

### Benefits

When looking at the benefits of an analysis with respect to the outcomes it is important to consider whether the clinical effectiveness has been established clearly (Heyland, et al, 1999). The benefits are viewed from the perspective of the society, the provider, the patient and the payer or health care facility. Because the benefits to the patient are a portion of the benefits to society, these two will be combined. These benefits will be reported as direct medical benefits or intangible benefits.

Since it is difficult to quantify the benefits in this scenario the measures will not be

converted. This makes the cost effectiveness analysis the most appropriate. This technique assumes that we will be able to achieve improved outcomes in exchange for the expense of resources (Sperry, 1997).

When measuring benefits there are three major types of benefits: health, productivity, and reduction in future medical costs. Better health is often difficult to determine or to verify that it is due to the medical program being studied. Often health care provides subtle gains and is difficult to measure in dollars (Getzen, T.E., 1997). The benefits of caring are often left uncounted but may have a significant impact on the patient's perceptions. A second benefit is productivity. The contributions to society through the labor market are a clear benefit of health care, but alone they form an incomplete and biased measure of the benefits of a treatment. The final category of benefits is the reduction of future medical costs. Most diseases are less costly to treat if diagnosed early and given early treatment to prevent further exacerbation, a prime example is immunizations. However there are times where the reduction of costs is not purely the only consideration when the focus is medical care, for example an organ transplant may cost hundreds of thousands of dollars with one victim saving several lives (Getzen, T.E., 1997).

#### Validity and Reliability

There are two factors that strongly affect the interpretability of a study. These factors are validity and reliability. Validity is the extent to which a test measures what we actually wish to measure. One type of validity is content validity. Content validity is the degree to which the content of the items in the analysis adequately represents the items that are relevant items under study. A method of evaluating the content validity of the analysis is judgmental and panel evaluation of the elements of the study to ensure that it is all-inclusive (Cooper, D. R. & Schindler, P. S., 1998). During this analysis there is panel assessment throughout the process.

The formation and activities of the Performance Improvement Committee combines many of the local experts involved in the ambulatory procedure process. This committee process allows them to judge each item to ensure that it is essential.

Although cost effectiveness analyses do not commonly employ statistical testing, portions of the analyses can benefit from statistical methods.. Uncertainty is inherent in any economic analysis and usually arises from the lack of precision in the clinical and cost data used, or from a bona fide lack of empirical data. A way to deal with this uncertainty is to perform a sensitivity analysis and to vary the estimates through a range of plausible values to determine what effect this has on the conclusions of the analysis (Heyland, et al, 1999). This process refers to the reliability of the data and the outcomes being presented. Reliability is the accuracy and the precision of the measurement of the process. A measure of reliability is the degree to which the process supplies consistent results (Cooper, D. R. & Schindler, P. S., 1998).

Post-analysis testing can include sensitivity analysis. A sensitivity analysis is used to examine the extent to which uncertainty in the cost and benefit data could affect the results of the analysis. The independent values are allowed to vary from those values that are measured in the study, and the cost effectiveness or cost benefit ratios are recalculated. If the independent variable, which may be the cost of the specific treatment, can assume a wide range of values without changing the conclusions drawn from the ratio calculations, then there is confidence in the results. If, in contrast, the conclusions are sensitive to a small change in the independent variables, then we can have less confidence in the conclusions drawn from the data. This sensitivity analysis is done by performing a univariate (one way) sensitivity analysis where the estimates for the important variables are changed one at a time. In addition a multivariate sensitivity analysis in which the key variables are allowed to vary at the same time. This type of

analysis is especially important when some of the variables are correlated (Sperry, 1997).

### Results

Although economic evaluations are not the sole basis for decision making, they do offer the manager information that can be used to maximize the health benefits of the resources available.

#### Workload

Table 2

#### CHAMPUS Costs and Workload

Total CHAMPUS visits for Orthopedics	391
Total CHAMPUS visits per month	32.58
Total amount paid	\$39,668.89
Paid per Procedure	\$101.45
Total procedures at Civilian Hospitals	228
Total allowed by CHAMPUS	\$430,249.43
Cost per procedure	\$1,895.37
Median allowable charge	\$768.64
Allowable range	\$7.92 - \$38,574.90

The number of visits and procedures performed by the PPN is an area that the orthopedic clinic is looking at as a potential for recapture. The workload of procedures, matching the CPT codes of procedures predicted to be done in the orthopedic minor procedure room, performed in the three German hospitals in the area that are CHAMPUS providers was 226 for FY 99. The



range of CHAMPUS allowable charges for those procedures was highly variable.

The workload for orthopedic outpatient procedures continues to remain high. The orthopedic providers in the LRMC Orthopedic Clinic performed 300, 382 and 311 outpatient procedures during FY 97, 98, and 99 respectively. While at the same time, podiatry continued to increase the number of procedures they were performing. The podiatry service performed 96, 98 and 219 procedures during the same years. These numbers include the entire amount of outpatient procedures done by both services. The workload for procedures that will potentially be done in the orthopedic minor procedure room was obtained by retrieving the data from ADS and a local procedure log that is maintained in the clinic. For orthopedics there were a total of 107 APVs and for Podiatry there were 229. This totaled 336 procedures. When considering total number of procedures in a year this is the number that will be used. Of these visits, because the clinic currently sees a limited number of beneficiaries other than active duty there were 275 active duty cases, 82%. It should be noted that the German community does not have a specialized podiatry service as is available in the American health care system. Therefore, it is prudent that much of that service should remain with the military treatment facility.

#### Manpower

Operating room personnel/manpower and supply costs required to deliver patient care are examples of variable direct costs. Manpower costs were determined by examining staff utilization for a standard procedure that is potentially performed in the minor procedure room. The time spent by staff for the status quo or the procedure being performed in the OR is compared to the staff time that is needed in the clinic based procedure room. It is assumed that the staff has available 168 hours per year.

Table 3

Manpower Costs

	Current/ Operating Room	Cost per hour	Cost per procedure	Time	Proposed Minor Room	Cost per procedure	Time
Physician (MAJ)	\$100,000/year	\$49.60	\$16.53	15-20 min	\$7,835/month	\$16.53	15-20 min
OR Technician (E5)	\$33,000/year	\$16.37	\$10.91	40 min			
Orthopedic Technician (E5)	\$33,000/year	\$16.37	\$5.46	15-20 min	\$3,296/month	\$16.37	60 min
Anesthesia (MAJ)	\$100,000/year	\$49.60	\$16.53	20 min	N/A		
Circulating Nurse (CPT)	\$78,000/year	\$38.69	\$19.35	30 min	N/A		
APU visit				30 min-1 hour	N/A		
Total personnel cost per procedure			\$68.78			\$32.90	

The time saved for the physician by the creation of the minor procedure room in the clinic is 30 minutes of time in going from the clinic to the OR to perform the procedure and one clinic slot that is used in preparation of OR time. For the patient, 3-4 hours of time will be saved and a separate trip to the hospital for pre operation preparations will be eliminated.

Supplies

The cost of supplies will be a cost transfer from the OR to the orthopedic clinic. The only new supply need for the clinic will be the basic OR pack that is provided by Central Material Supply. The cost of this pack is \$9.96 and is the same cost that is incurred by the same case in the OR. There will be no new supply purchases for the clinic.

Equipment

Equipment costs were calculated using straight-line depreciation and expected life span of eight years for each piece of equipment.

Table 4

Equipment costs

<u>Equipment</u>	
Surgical Light	\$9,000.00
Tourniquet Box	\$21,840.00
Cabinets	\$28,100.00
Total equipment	\$58,940.00
Depreciation of equipment	\$7,367.50
Contracts for construction	\$108,854.00

Assuming that the number of cases per year remains 336, the cost of the equipment per procedure after depreciation is \$21.93.

Overall Cost per Procedure

Table 5

Cost of Orthopedic and Podiatry Ambulatory Procedure Visits Status Quo Compared to  
Following the Reconstruction of the Minor Procedure Room

	Status Quo for orthopedics in OR (BEA5)	Status Quo for Podiatry in OR (BEF5)	Performed in Minor Room (BEA5)	Performed in Minor Room (BEA5)
Total expenses for FY99	\$505,299.20	\$296,735	\$88,374.59	\$26,543.84
Total direct expenses	\$20,223.00	\$0	\$26,607.00	\$0
Total step down from D account	\$483,273.49	\$296,581.34	\$48,584.59	\$26,322.84
Total step down from E account	\$1,802.71	\$153.81	\$13,183.00	\$221.00
Total ambulatory procedure visits	304	213	107	229
Direct expenses per visit	\$66.52	\$0	\$248.66	\$0
Personnel per visit	\$32.90	\$32.90	\$32.90	\$32.90
Cost of new equipment per procedure	\$0	\$0	\$21.93	\$21.93
Step down from D account per visit	\$1,589.72	\$1,392	\$454.06	\$114.95
Step down from E account per visit	\$5.93	\$0.72	\$123.21	\$0.97
Total expenses per procedure	\$1,695.07	\$1,426.02	\$880.76	\$170.74

The above table shows cost savings by reconstructing the minor procedure room of 48% for orthopedic procedures and 143% for podiatry.

Sensitivity Analysis

The projected number of cases to be done in the procedure room is 4-8 procedures per day and approximately 2 days per week. This then leads to approximately 400-800 procedures per year, given 50 weeks available in a year. During FY 99, of the 336 cases that would potentially be performed in the orthopedic minor procedure room, 32% were orthopedic and 68% were podiatry. Assuming that the percentage of the case mix remains the same, the sensitivity analysis is performed to examine the predicted case range as well as a worst-case scenario. The costs are calculated for a worst-case scenario where the clinic does not meet its projections and performs only 200 cases.

Table 6

Univariate Sensitivity Analysis

	200 procedures (BEA5)	200 procedures (BEF5)	400 procedures (BEA5)	400 procedures (BEF5)	800 procedures (BEA5)	800 procedures (BEF5)
Total expenses for FY 99	<b>\$88,374.59</b>	<b>\$26,543.84</b>	<b>\$88,374.59</b>	<b>\$26,543.84</b>	<b>\$88,374.59</b>	<b>\$26,543.84</b>
Total direct expenses	<b>\$26,607</b>	<b>\$0</b>	<b>\$26,607</b>	<b>\$0</b>	<b>\$26,607</b>	<b>\$0</b>
Total step down from D account	<b>\$48,584.59</b>	<b>\$26,322.84</b>	<b>\$48,584.59</b>	<b>\$26,322.84</b>	<b>\$48,584.59</b>	<b>\$26,322.84</b>
Total step down from E account	<b>\$13,183.00</b>	<b>\$221.00</b>	<b>\$13,183.00</b>	<b>\$221.00</b>	<b>\$13,183.00</b>	<b>\$221.00</b>
Total ambulatory procedure visits	76	124	128	272	204	496
Direct expenses per visit	<b>\$248.66</b>	<b>\$0</b>	<b>\$248.66</b>	<b>\$0</b>	<b>\$248.66</b>	<b>\$0</b>
Personnel per visit	<b>\$32.90</b>	<b>\$32.90</b>	<b>\$32.90</b>	<b>\$32.90</b>	<b>\$32.90</b>	<b>\$32.90</b>
Cost of new equipment per procedure	<b>\$21.93</b>	<b>\$21.93</b>	<b>\$21.93</b>	<b>\$21.93</b>	<b>\$21.93</b>	<b>\$21.93</b>
Step down from D account per visit	<b>\$454.06</b>	<b>\$114.95</b>	<b>\$454.06</b>	<b>\$114.95</b>	<b>\$454.06</b>	<b>\$114.95</b>
Step down from E account per visit	<b>\$173.46</b>	<b>\$1.78</b>	<b>\$102.99</b>	<b>\$0.81</b>	<b>\$43.37</b>	<b>\$0.45</b>
Total expenses per visit	<b>\$909.09</b>	<b>\$149.63</b>	<b>\$838.62</b>	<b>\$148.66</b>	<b>\$778.99</b>	<b>\$148.29</b>

Within MEPRS the D account includes costs associated with ancillary services. These are functions that participate in the care of patients principally by assisting and augmenting the attending physicians in diagnosing and treating the patient. Examples of these costs are laboratory, pharmacy, radiology, central material supply, anesthesiology and the surgical suite. Additionally in the step down process for the accounting of costs E accounts are used. Within this account support services are accounted for. These include those expenses necessary to direct and support the mission of the MTF for example command functions, management and administration services (Medical Expense and Performance Reporting System Manual, 1995). Because the total MEPRS expenses for the E account are based on square footage there is no change with the change numbers of procedures performed. It is assumed that the amount of direct expenses and the D account remains the same per procedure. These amounts are stepped down based on workload performed. When the amount of procedures is varied there continues to be a cost savings noted for the cost per procedure.

#### Discussion

Studies on the economics of day surgery have noted an average cost difference between inpatient and ambulatory surgery. The cost advantage to the patient is cost savings that can range from 20% to 65%. Differences in costs are difficult to compare in the literature because of the differences in costing structures. For this reason most of the literature compares the costs to patient. However previous studies tend to agree that ambulatory surgery leads to lower average costs than the equivalent inpatient procedure (Mitchell, Kenyon, & Monks, 1999).

This study compared the ambulatory surgery process and costs of a procedure being performed in the main operating room and the same procedure being performed in a minor procedure room in the Orthopedic Clinic. It provides a look at the cost reduction potentials as

well as the changes in access that can occur at LRMC. The relevance of this study is focused on the practice at LRMC.

As expected the cost effectiveness of the reconstruction of the orthopedic minor procedure room was clear. The cost savings for an orthopedics procedure ranged from \$785.98 per APV to \$916.08 per APV while at the same time the savings for podiatry ranged from \$1,276.39 to \$1,277.73. In order to continue the improvement and to be able to monitor the effects of the changes in the processes that were made it is important to identify the metrics that will be followed over time. Given that 82% of the cases performed in FY 99 were for active duty patients, it is important to monitor the change in the ratio of active duty to other beneficiaries. This will allow the clinic to evaluate their increased access to other beneficiaries. In addition, other outcomes important to monitor include (1) the number of days it takes a patient from their initial referral until their first appointment is scheduled, (2) the number of days from their appointment where it is noted that they need a procedure until it is done and (3) their MEPRS cost per procedure and visit.

This study was performed in a single military facility using the cost accounting systems applicable to the military financing systems. The results are not necessarily transferable to other institutions with other cost accounting systems. Generalizing the results of this study to other military treatment facilities (MTF) must be critically interpreted, although the process is similar to those resources found at other MTFs. Having an understanding of the processes in a MTF offers promise in management opportunities to increase efficiencies and to optimize the utilization of resources. However, other managers within LRMC can use this analysis and the methods to analyze their business process and utilization costs.

Limitations of the results of this study also include the data quality of the information in



the expense reporting system. Data quality is integral to the development of good business practices while providing quality health care. An emphasis on data quality ensures that reliable data is collected for business analyses including financial, clinical workload and personnel information. The three things that affect data quality in facilities are the culture, its business processes and people that generate the data (Hardben, 1999). Data is the basis for business decisions and if the information input on the user end is not accurate then the decisions may not be appropriate.

Despite the fact that data quality is questionable in particular for the personnel costs, which was compensated for through calculating the costs external to the MEPRS data, savings are still predicted. This increases the likelihood of cost savings if perfect data were available.

This study was done assuming that all patients would only be receiving local anesthetics. Changing the case mix of the patients and increasing the amount of anesthesia needed would change the amount of staff and skill of that staff needed to care for the patient. Additionally it would change the recovery of the patient and could therefore increase the amount of space needed to perform the minor procedure

### Conclusions and Recommendations

This cost effective analysis showed that by renovating the minor procedure room in the Orthopedic Clinic positive benefits will be noted to patient time, physician time and a decrease in the current backlog of surgical procedures. This improvement in the process, for those patients that require minor procedures, will be a more efficient use of the available resources to include patient, OR and physician time. The greatest cost to a medical facility is in the delivery of surgical care in the operating room and of that personnel costs are the largest proportion. For this reason an improved utilization of OR staff and time can lead to cost savings for a health care

organization. In addition improved use of OR time is expected to decrease the backlog by allowing other services to use that time that was being used by orthopedics and podiatry for patients that could have been done elsewhere. These changes will allow the orthopedic and podiatry physicians to more efficiently use their time and in the future be able to open up more appointments to beneficiaries therefore improving access to care. These changes in access will also allow for increased reimbursements for the surgeries that will be done and the increased access to other beneficiaries with third party insurance. Once the renovations are complete the clinic will be able to monitor the metrics developed to ensure that there continues to be improvements in efficiency. Additionally they need to trend and monitor changes in patient satisfaction and complications due to the change in location. When developing these minor procedure rooms in clinic settings it is important to remember that the standard of care needs to remain consistent with the same standard of care that the patient would be receiving if the procedure would have been performed in the Operating Room. It is important for hospital department managers to combine clinical and financial data to determine the operating costs of their department.

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